ENVIRON

December 10, 2011

Ms. Sharon Fang, P.E.
Remedial Project Manager (3HS21)
U.S. EPA Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Re: Metal Bank Cottman Avenue NPL Site
Monthly Report due December 10, 2011
Reporting Period: November 1 through November 30, 2011

Dear Ms. Fang:

As provided in Paragraph 31 of the Utility Consent Decree, and on behalf of the Cottman Avenue PRP Group, Environ Corporation as the Supervising Contractor is submitting to USEPA three copies of a written monthly progress report. Copies of the monthly progress reports are attached to this letter.

Please contact the Designated Project Coordinator, Dr. John Dobi (973.430.8036) or me (617.946.6115) if you need additional information regarding this submission.

Very truly yours,

Environ International Corporation

Joseph P. Vitale

Joseph P. Vitale, PE
Project Director

cc: Cottman Avenue PRP Group
Steering and Technical Committees
Dan J. Jordanger, Esquire

Enclosures
3328374

Project Name: Metal Bank NPL Site	For the Month: November 2011	
Project Location: Philadelphia, PA	Report Number: 68	Dated: December 10, 2011

Name: Joseph P. Vitale (Environ)	Title: Project Director
Telephone No.: (617) 946-6115	Telefax No.: (617) 946-3229

Reporting Period: November 1 through November 30, 2011

(a) Describe the actions, including submittal of work plans and other deliverables, which have been taken toward achieving compliance with the Consent Decree during the previous month:

Actions or Deliverables	Dates Performed or Submitted
Met with EPA and PA DEP to discuss the Long-term Monitoring Program	Attended meeting at EPA's offices in Philadelphia on November 2, 2011
Conducted Benthic Community Survey	Field site activities performed on November 16 and 17, 2011
Conducted Sheet Pile Wall Inspection	Field inspection conducted on November 16, 2011
Conducted inspection of the E&S Control Measures	Emailed Sharon Fang on November 16, 2011 with pictures attached showing debris encroaching on the Metal Bank project from adjacent properties
Continued evaluation of fish tissue data comparing validated data derived from EPA's and the Group's analytical laboratories	Sought through November to continue communications between data validators.
Sent Response to EPA's Letter dated October 19, 2011 regarding the vegetative cover	Sent via email to Sharon Fang on November 22, 2011
Presented detailed evaluation for collecting site-specific bioaccumulation data using corbicula	Submitted Technical Memorandum prepared by Mike Bock via email to Sharon Fang dated November 30, 2011
Provided log documenting the inspections conducted by Normandeau during the bioaccumulation study in July 2011	Submitted a copy of the log via an email to Sharon Fang dated November 30, 2011.

(b) List summaries of inspections, sampling, testing, and other data received or generated in the previous month, and when possible, attach the documentation to this report:

Submittals	Dates Performed	Attached/Separate Cover
Conducted Sheet Pile Wall Inspection	November 16, 2011	Attached to this monthly report
Conducted inspection of the E&S Control Measures	November 16, 2011	Attached email and photo log
Sent Response to EPA's Letter dated October 19, 2011 regarding the vegetative cover	Dated November 22, 2011 and forwarded to Sharon Fang via email on the same date	Attached email and letter
Technical Memorandum from Mike Bock of Environ to Joe Vitale expanding on alternative approach to collecting bioaccumulation data	Dated November 30, 2011 and forwarded to Sharon Fang via email on the same date	Attached email and technical memorandum
Log documenting the inspections conducted by Normandeau during the bioaccumulation study in July 2011	Dated November 30, 2011 and forwarded to Sharon Fang via email on the same date	Attached email and technical memorandum

(c) Describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next month and provide other information relating to the progress of work:

The current 2-month look-ahead schedule for LTM O&M is as follows:

LTM Activities	Start Date	Anticipated Completion Date
Benthic Community Survey Report	11/17/2011	12/30/2011
E&S control measure repairs	12/6/2011	12/16.2011
Validated Groundwater Data	12/7/2011	1/15/2012

(d) Include information that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays:

- All LTM O&M commitments are on schedule except for silt fence repairs. Delays on these repairs are due to debris from neighboring properties encroaching on to the Metal Bank property. Morris Steel and Revolution Recovery removed the debris on December 6, 2011. Most of the silt fence repairs were completed on that date. Remaining repairs

should be completed on December 16, 2011.

- We are waiting on a decision from EPA regarding our October 26, 2011 request to eliminate the annual upland and bathymetric survey requirement for 2011.

(e) Include any modifications to the work plans or other schedules that the Utility PRP Group has proposed to EPA or that have been approved by EPA:

- None

(f) Describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next month:

- The Group will coordinate with EPA on any community outreach endeavors on an as needed basis through the Long Term Monitoring period.

Metal Bank NPL Site
Philadelphia, PA
Sheet Pile Wall Monitoring

In accordance with the approved Long Term Monitoring (LTM) Work Plan (Section 4.8), tiltmeters were installed at three locations (one in each zone) along the sheet pile wall in August 2010 to monitor potential rotation of the wall. EL-SC tiltmeters manufactured by Durham Geo Slope Indicator were installed at the Site. The EL tiltmeter is a narrow angle, high resolution device for monitoring changes in the inclination of a structure. According to the manufacturer, specific applications for these tiltmeters include:

- Monitoring the rotation of retaining walls, piers, and piles,
- Monitoring the behavior of structures under load.

The tiltmeter consists of an electrolytic tilt sensor housed in a compact, weatherproof case. The tilt sensor is a precision bubble-level that is sensed electrically as a resistance bridge. The bridge circuit provides a voltage proportional to the tilt of the sensor.

Each tiltmeter has its own serial number and comes from the manufacturer with an information sheet containing unique polynomial factors necessary to convert the readings obtained in the field to tilt in degrees.

Attached is a Summary of the Sheet Pile Wall Monitoring Results (Summary) as well as the Sheet Pile Wall Monitoring Data Form (Form). The Summary presents the verticality measurements converted to degrees obtained in the three sheet pile wall monitoring zones during the monitoring period from August 2010 to November 2011. The Form includes the tiltmeter number, serial number, location, date that the reading was obtained, the reading (x), and the tilt of the wall converted to degrees. Also included on the form are the unique conversion constants (C5 through C0) for each meter and the Conversion Formula.

Since August 2010, nine readings at each tiltmeter location have been recorded. The results remain near 0.0 degrees at each location during the monitoring period from August 2010 to November 2011, indicating that the sheet pile wall is not rotating nor approaching the action level of 2 degrees.

The sheet pile wall will continue to be monitored in accordance with the approved LTM Work Plan.

Attachment 1
Metal Bank NPL Site
Philadelphia, PA

Summary of Sheet Pile Wall Monitoring Data

Monitoring Date	Tilt in Degrees*		
	Eastern Location	Central Location	Western Location (Mudflats)
8/24/2010	0.013	0.006	-0.010
9/28/2010	0.001	0.029	-0.044
10/26/2010	-0.002	0.028	-0.040
12/2/2010	0.002	0.046	-0.038
1/4/2011	-0.016	0.028	-0.050
2/3/2011	-0.013	0.031	-0.045
5/17/2011	-0.014	0.044	-0.047
8/17/2011	-0.001	0.057	-0.038
11/16/2011	-0.001	0.057	-0.042

*Per Section 4.8 of the approved LTM: "If the rotation of the wall is determined to be less than two degrees after two years, no further monitoring will be conducted. If the rotation of the wall is determined to be greater than two degrees (after any period of time following commencement of monitoring), then the monitoring will continue and the design engineer will be contacted for corrective measures that may be necessary to halt the rotation."

Attachment 2
Metal Bank NPL Site
Philadelphia, PA
Sheet Pile Wall Monitoring Data

Tiltmeter 1: Serial No. 15838 Central Location		Date	Reading (X)	Tilt in Degrees
C5	0.0091976	8/24/2010	0.0258	0.006
C4	0.0113037	9/28/2010	0.127	0.029
C3	-0.0242878	10/26/2010	0.1211	0.028
C2	-0.0169799	12/2/2010	0.2023	0.046
C1	0.235161	1/4/2011	0.1212	0.028
C0	-0.000294	2/3/2011	0.1349	0.031
		5/17/2011	0.1921	0.044
		8/17/2011	0.2495	0.057
		11/16/2011	0.2479	0.057

Tiltmeter 2: Serial No. 15833 Mudflat Location		Date	Reading (X)	Tilt in Degrees
C5	0.0045921	8/24/2010	-0.0323	-0.010
C4	-0.0051808	9/28/2010	-0.2033	-0.044
C3	-0.0130913	10/26/2010	-0.1822	-0.040
C2	0.0080993	12/2/2010	-0.1696	-0.038
C1	0.20543	1/4/2011	-0.2321	-0.050
C0	-0.003096	2/3/2011	-0.2071	-0.045
		5/17/2011	-0.2159	-0.047
		8/17/2011	-0.1718	-0.038
		11/16/2011	-0.1913	-0.042

Tiltmeter 3: Serial No. 15832 River Location		Date	Reading (X)	Tilt in Degrees
C5	0.0174527	8/24/2010	0.054	0.013
C4	-0.0111312	9/28/2010	0.0031	0.001
C3	-0.0116	10/26/2010	-0.0076	-0.002
C2	0.0040952	12/2/2010	0.0078	0.002
C1	0.24277	1/4/2011	-0.066	-0.016
C0	0.0000317	2/3/2011	-0.0553	-0.013
		5/17/2011	-0.0564	-0.014
		8/17/2011	-0.0051	-0.001
		11/16/2011	-0.0024	-0.001

Conversion Formula: C5(X^5)+C4(X^4)+C3(X^3)+C2(X^2)+C1(X)+C0

From:	Joseph Vitale
To:	fang.sharon@epa.gov
Cc:	John Dobi (john.dobi@pseg.com); (George.Horvat@exeloncorp.com); Jordan Hill
Bcc:	Dan Jordanger (djordanger@hunton.com)
Subject:	Metal Bank
Date:	Wednesday, November 16, 2011 10:31:00 AM
Attachments:	20111027 Metal Bank Photo Log.pdf

Hi Sharon:

We are planning to conduct some repairs on some portions of the silt fence by the end of the month. However, debris from the neighboring property (Revolution Recovery) needs to be removed prior to undertaking the repairs. (See attached pictures #2 through #4 generated during our October 2011 inspection. Copies of these picture were previously provided to EPA as part of the October Monthly report Package). We would appreciate if EPA would discuss this issue directly with the owner of Revolution Recovery and request that the debris be removed from the Metal Bank property as soon as possible.

If you have any questions, please give me a call.

Joseph P Vitale, PE, LSP | Principal Consultant
ENVIRON | www.environcorp.com
20 Custom House Street, 8th Floor, Boston, MA 02110
V: 617-946-6115 | M: 617.721.2766 | F: 617.946.3229 **jvitale@environcorp.com**

Photo 1: Silt fence by old construction road.

Photo 2: Debris from Revolution Recovery. Silt fence has been covered.

Title:	Site Inspection Log	ENVIRON
Site:	Metal Bank Superfund Site	Dates: October 27, 2011

Photo 3: Debris from Revolution Recovery. Silt fence has been covered.

Photo 4: Silt fence by Revolution Recovery in place, but has been crushed by debris at other points (as shown in Photos 2 and 3).

Photo 5: Silt fence on eastern side of site, in need of repair.

Photo 6: Silt fence in northeast corner in place.

Photo 7: View of vegetation from southeast corner looking southwest.

Photo 8: View of drainage swale in southeast corner – no sediment, but silt fence in need of repair.

Photo 9: Interior of Building 7.

From:	Joseph Vitale
To:	fang.sharon@epa.gov
Cc:	(George.Horvat@exeloncorp.com); John Dobi (john.dobi@pseg.com); mpollich@pa.gov; Pluta.Bruce@epamail.epa.gov
Bcc:	Dan Jordanger (djordanger@hunton.com)
Subject:	Metal Bank
Date:	Tuesday, November 22, 2011 6:01:00 PM
Attachments:	Fang 11 22 11.pdf

Hi Sharon:

Attached to this email is our response to EPA's letter dated October 19, 2011 regarding the Vegetative Cover Plan.

Sharon,

Regarding the Fish data set, David Thal of Environmental Standards (Group's Data Validator) has made several attempts to discuss with Mr. Mahoney (EPA's Data Validator) on how he re-calculated EPA's Fish data set as presented in your letter dated October 19, 2011. It is my understanding that Mr. Mahoney has not returned any of Mr. Thal's phone calls regarding this subject. Until this matter is resolved or at least reasonably understood, we will not be able to respond to your request to conduct a fish study in 2012.

Please feel free to give me a call regarding this matter.

Joseph P Vitale, PE, LSP | Principal Consultant
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ENVIRON

November 22, 2011

Sharon Fang, PE
Remedial Project Manager
United States Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Metal Bank NPL Site,
Responses to EPA Comments
Dated October 19, 2011 Regarding
Vegetative Cover Plan

Dear Ms. Fang:

Environ has reviewed the Environmental Protection Agency (EPA) letter to Dr. Dobi dated October 19, 2011, and below are each of EPA's comments and our responses regarding the Vegetative Cover Plan that was submitted to EPA on July 25, 2011.

1) Woody species can become dominant even if the caliper of each individual plant stays below 0.5 inches. A regular mowing regime should be instituted to maximize the vigor of the herbaceous vegetation and control woody species. We suggest mowing every three years. This may be conducted at the same time or the site may be divided and sections mowed annually with the areas cut rotated so a given area is cut only once every three year.

We will revise the vegetative cover plan as suggested by this comment. We will continue to maintain the height of vegetation below 18" during the 2012 growing season consistent with Ernst Conservation Seed Inc.'s recommendation to promote the growth of desired grasses and mow to a height of 18" every three years thereafter to promote herbaceous vegetation and control woody species.

2) The statement regarding control of invasive plants is inadequate. First, it does not commit to any action (i.e., "…strategies may be employed…"), and second, the triggering action is too vague (i.e., " observed at an increasing density."). Please provide more detail.

An invasive species control program will be implemented consisting of monitoring and treatment of areas of non-native, invasive vegetation. Monitoring of the restoration area will be needed to identify if invasive species are becoming established and if measures are warranted to address the problem. Monitoring will be conducted in late spring of each year (June) to assess the presence of invasive species. Prior to field inspection, a fact sheet that includes photographs and descriptions of each invasive species potentially of concern in the area will be prepared to assist in identification of invasive species.

The initial monitoring event will include a review of aerial photographs, and inspection of the 9-acre restoration area using random transects. When an area of invasive species is encountered, the area will be marked with pinflags/grade stakes, extent (approximate square footage) and GPS coordinates will be

recorded. Upon completion of the survey, extent of invasive species coverage will be estimated. If invasive species coverage extends to greater than 10 percent of the total restoration area, a control plan will be developed specific to the species. As part of this plan, we will evaluate whether it is feasible to control the growth of invasive species given that certain invasive plants are found prevalent in the surrounding properties of the Metal Bank site.

Control measures typically fall into one of three categories: mechanical, chemical, or biological. Mechanical methods (digging and pulling) are only effective for smaller areas of species without an extensive root structure. Biological methods have only been developed for a small number of invasive plants (primarily purple loosestrife, an invasive wetland plant species), and there are greater uncertainties associated with their use. In most instances, chemical control measures are typically needed to control invasive species. Although specific treatments will be refined based on the results of the monitoring program, it is anticipated that the most effective general approach for controlling invasive species in the majority of the area will be application of herbicides during the growing season (summer through fall) and then to cut (mulch) the invasives during the winter. Repeat spot herbicide application may be required in the following growing season to achieve effective control.

Again, it should be noted that certain invasive plants are found prevalent in areas surrounding the site. As a result, we will continue to evaluate the efficacy of controlling the growth of invasive species for the Metal Bank site.

Environ incorporated these modifications into the attached final version of the Vegetative Cover Plan of the LTM Plan.

If you have any questions or need further information, please call me at (617) 946-6115.

Sincerely,

Environ International Corporation

Joseph P. Vitale

Joseph P. Vitale, PE, L.S.P.
Project Director

Copies:
Cottman Avenue PRP Group
Dan J. Jordanger, Esquire
Jeffrey N. Martin, Esquire

Metal Bank NPL Site
Philadelphia, PA

Vegetative Cover Plan
Original Submitted: July 2011 by ARCADIS
Revision #1: November 2011 by ENVIRON

On behalf of the Utility Group, ENVIRON has prepared this Vegetative Cover Plan in response to a request from the U.S. Environmental Protection Agency (US EPA) for a modification of the approved Long Term Monitoring (LTM) activities presented in Section 4.2 of the Remedial Action Work Plan. That section concerns the establishment and maintenance of the vegetative cover installed as part of the remedial action performed at the Metal Bank NPL Site.

Background

A component of the remedy constructed at the Site by Sevenson Environmental Services of PA includes the installation of a soil cap with vegetative cover in the northern portion of the Site referred to as the "Courtyard Area" and the southern portion of the Site referred to as the "Southern Area". The remedial action construction activities were substantially completed in January 2010 with the application of the specified seed mix – Ernst 123 Native Wildlife Forage and Cover Meadow Mix[1] – by hydroseeding as indicated in the construction specification Section 02910 Parts 2.01.A.1. and 3.01.D.2.

The approved LTM Section 4.2 – Upland Cap Monitoring requires:

- Quarterly visual surveys of the upland cap area will be conducted to investigate for indications of settlement, cracks/fissures, erosion, seeps and/or other conditions that would compromise the physical integrity of the cap.
- Annual elevation surveys of the upland cap will be conducted to check cap thickness.
- An inspection survey will be conducted after each 25-year storm event.
- Upland cap monitoring activities continue until the cleanup standards are met or US EPA otherwise determines that monitoring is no longer required.
- During the first two years following cap construction, the condition of the vegetative layer of the cap will be assessed twice per year during late spring and late summer. In the third year and thereafter, the cap vegetation will be assessed annually at mid-summer. [The percentage of vegetative cover and the percentage of non-native, invasive vegetation will be determined and reported at ten randomly selected locations on the cap. Locations with no or limited vegetation or invasive vegetation will be identified. Actions to remedy any condition noted will be identified and implemented.]

[1] Warm-season native grasses are bunch grasses, meaning that each seed produces a plant that will eventually grow into a large bunch with many stems. These grasses are also very tall, reaching 4 – 6 feet or more, with very deep roots (5 – 6 feet).

Currently there remain two areas on-Site where little to no growth has been observed consistently during the LTM period. These areas are depicted in attached Figure 1.

Technical information provided by Ernst Conservation Seeds, Inc.[2] (the seed supplier) and in publications such as Pennsylvania Wildlife No. 12 Warm-Season Grasses and Wildlife, published by Penn State University,[3] indicates that most of the growth of warm-season grasses during the first growing season is downward to establish roots, and that it may take several years before the vegetation appears to have established itself. Also, depending on when the seeds are planted, some seeds will remain dormant until the second growing season. After the roots become established and the seeds break dormancy, more aboveground growth should occur each year. This process can take several years until the grass looks as if it has really established itself throughout the planted area. During this period it is essential to control weeds that may grow and shade out or compete with the desired grasses.

Field implementation experiences with the Native Wildlife Forage and Cover Meadow Mix have been communicated to the US EPA by the Group's vegetation restoration landscaper – Enviroscapes Inc. – validating the typical growing pattern in the climatic region of the site.

This Vegetative Cover Plan presents the Group's plan to address the two areas lacking vegetative cover as of July 2011 and identifies path-forward planned operations, maintenance, and inspection activities to be performed at the Site to promote the growth of the vegetative cover to attain the goals of the LTM.

Previously Completed Corrective Measures

As a result of observations and agreements made by the Group and US EPA during numerous site inspections and meetings conducted since January 2010, the Site was re-seeded with the specified seed mix several times during the LTM period. Specifically, (1) a 10,000 square foot portion of the Site was re-seeded in April 2010, (2) the entire Site was re-seeded in August 2010 utilizing a Truax slit seeder, and (3) the entire Site was re-seeded again in December 2010 utilizing a Truax slit seeder.

Proposed Short Term Corrective Measures

Presented below are the proposed implementation plans to address the two areas lacking vegetative cover as of July 2011:

Compost

As discussed above, there are two areas on-Site where little to no growth of the desired plant species has been observed. These areas are: 1) in the northern portion of the

[2] Ernst Conservation Seed, Inc. Product Catalog available online at: http://www.ernstseed.com/files/catalog/catalog_5.11.09.pdf page 37 of 129

[3] DeLong, C. and M. Brittingham. Pennsylvania Wildlife No. 12, Warm-Season Grasses and Wildlife. Penn State University, College of Agricultural Sciences, 2002.

Southern Area and 2) in the Courtyard Area to the north of Building 7 (see Figure 1, attached).

To enhance the organic content of the soil in these areas, the Group will import compost to the Site. As per Ernst's recommendation the compost will consist of well aged, decayed vegetative matter. A veneer of compost, approximately 2 inches thick, will be spread over the identified areas. The compost will then be tilled into the soil to a depth no greater than 6 inches.

On behalf of the Group, Enviroscapes Inc has identified a source of compost – Peninsula Compost Company Wilmington, DE - to meet the US EPA performance criteria in source, quality, and weed seed free. Detailed information was provided to the US EPA via an e-mail correspondence on September 28, 2011 which provided the operating permit which limits the materials to food wastes, lawn wastes, wood wastes, and animal bedding for the production of the compost; analytical results for both chemical and agricultural parameters; and a comparison of the compost to the US EPA approved cover soils previously placed on the Metal Bank Site. Since Peninsula Compost brings the compost up to a minimum of 131 degrees Fahrenheit two (2) times during the composting process, the final compost product is considered "weed seed free". The Group has gained the US EPA's approval on September 28, 2011 (email). Enviroscapes Inc. applied Peninsula Compost Company material on October 11, 2011. Steve Langseder of ARCADIS emailed Sharon Fang of EPA on October 27, 2011 a trip report documenting the compost application.

Seed Application

Chisel plowing the top six (6) inches of soil was used to reduce soil compaction. Certified clean compost was obtained from Peninsula Compost Company, which contained an approximate organic content ranging from 45% to 51%, by weight. Furnishing and installing a two (2) inch layer of organic compost using a low ground pressure skid steer and hand raking enabled approximately 160 cubic yards of organic compost to be placed. Roto-tilling the amended areas to a depth of six (6) inches using a rubber-tired tractor with a roto-tiller attachment ensured a proper distribution of compost. Seeding the amended areas was completed using a Truax FLXII-88 grass drill. The Truax FLXII-88 grass drill was equipped with multiple seed boxes that accommodated cool season, warm season, and legume seed mixes recommended by Ernst Conservation Seeds. The intended cover crop is a quick germinating short grass intended to serve as a protective erosion and sediment control measure until the warm-season grasses become established. Straw mulch was distributed over the seeded areas applied at a rate of one (1) ton per acre. Over-seeding of an additional two (2) acres on-site was completed, based on field observations (no mulch required). These additional areas were seeded using a Truax FLXII-88 grass drill. The Truax FLXII-88 grass drill is equipped with multiple seed boxes that accommodated the seed mix recommended by Ernst.

Enviroscapes placed the compost and applied the seed on October 11, 2011. An email documenting these actitivities was sent to EPA on October 27, 2011.

Mowing

A mowing plan was developed by Ernst Conservation Seeds, Inc., submitted to the US EPA on July 14, 2011, and approved by the US EPA on July 18, 2011. The key components of the mowing activities in the short term included:

- Mowing using an Ambusher or equivalent cutting equipment
- Mowing to a height of approximately 4 to 8 inches
- Mowing the site in a particular weave pattern, followed by mowing the clippings in a perpendicular pattern to the first cut pattern
  Monitoring growth and recutting if/when vegetation height exceeds 18 inches.

A Group contractor cut the vegetation to a height of approximately 4 to 8 inches on Thursday, July 21, 2011.

Following the cutting of the vegetation in July 2011, the Group continued to monitor the growth of vegetation. On September 27th, ARCADIS conducted a site inspection with EPA and they determined that an additional cutting was required because a large portion of the vegetation exceeded 18 inches. On October 10, 2011, Enviroscapes mowed the vegetation in a similar manner as the cutting plan that was previously approved by EPA on July 18, 2011. In the spring of 2012, we will cut the entire vegetative cover to a height of 4 to 8 inches, and in the spring of 2013, we will cut the 2011 repair areas only to a height of 4 to 8 inches.

ENVIRON will follow the Ernst recommended mowing guidelines and incorporate them into the LTM through 2012 growing season.

Long Term Actions

Presented below are the proposed long term implementation plans to address the vegetative cover's attainment of the LTM goals:

Mowing

After 2013, we will cut the vegetation to a height of 18" every three years thereafter to promote herbaceous vegetation and control woody species.

Monitoring and Inspections

The Group will continue to follow the approved LTM Plan providing for quarterly monitoring of the landfill cap for integrity, annual assessment of the vegetative cover in early summer, and post storm event monitoring. If the goals of the approved LTM Plan are not being attained on or before September 30, 2012, a corrective measure plan will be developed and submitted to the US EPA for approval.

Below is a table depicting the planned inspection dates for the vegetation monitoring.

Year	Inspection Date
2011	Second week of September (week of the 12th)
	Second week of November (week of the 7th)
2012	Late April (week of the 23rd)
	Mid June (week of the 18th)
	Mid September (week of the 10th)
	Mid November (week of the 12th)
2013	Semi-Annual (to be determined)

Application of Fertilizers and/or Water

The application of fertilizers and water is not planned as part of this plan since the desired plant species are native to the area and should thrive in the local soil and under the local climatic conditions.

Invasive Species Control Program

An invasive species control program will be implemented consisting of monitoring and treatment of areas of non-native, invasive vegetation. Monitoring of the restoration area will be needed to identify if invasive species are becoming established and if measures are warranted to address the problem. Monitoring will be conducted in late spring of each year (June) to assess the presence of invasive species. Prior to field inspection, a fact sheet that includes photographs and descriptions of each invasive species potentially of concern in the area will be prepared to assist in identification of invasive species.

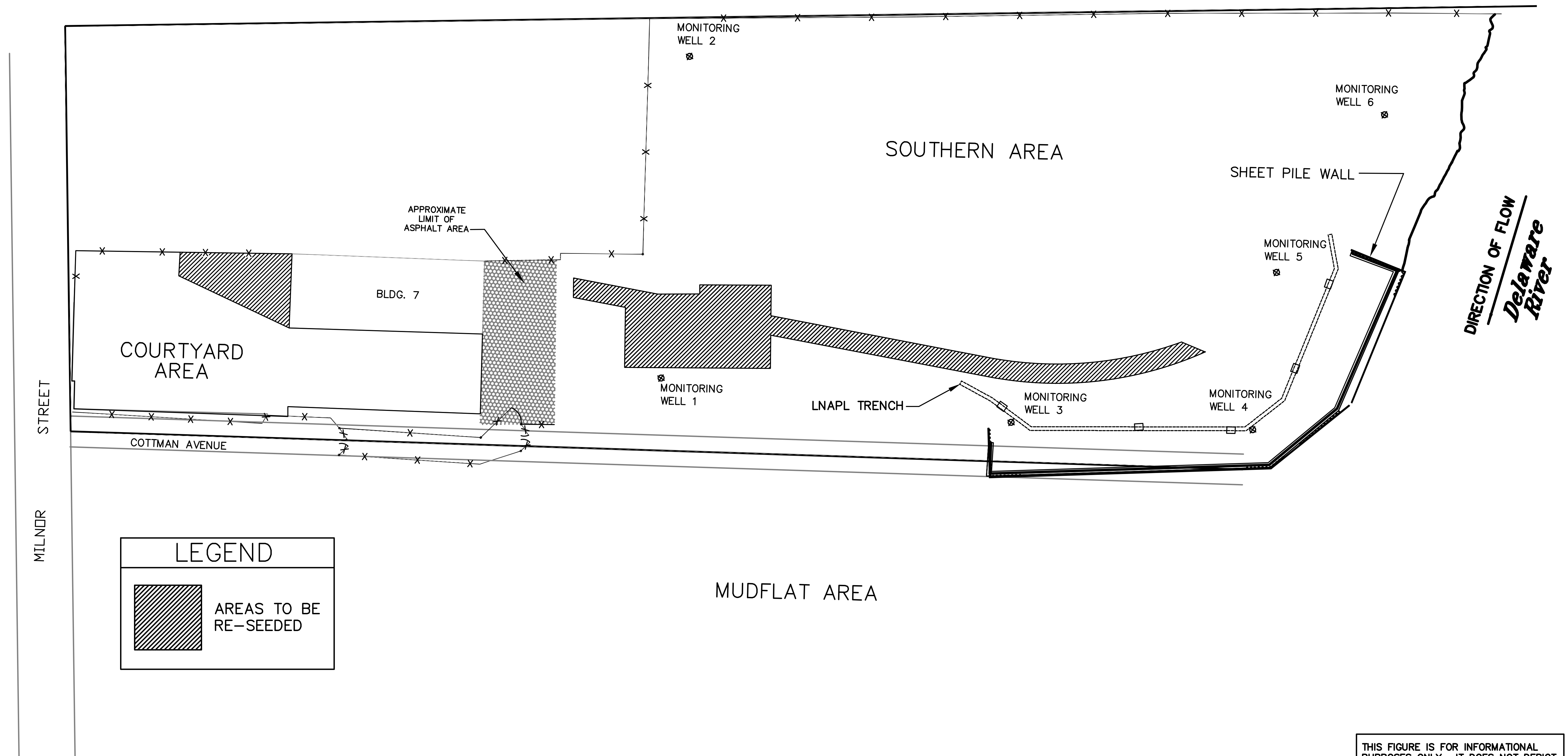
The initial monitoring event will include a review of aerial photographs, and inspection of the 9-acre restoration area using random transects. When an area of invasive species is encountered, the area will be marked with pinflags/grade stakes, extent (approximate square footage) and GPS coordinates will be recorded. Upon completion of the survey, extent of invasive species coverage will be estimated. If invasive species coverage extends to greater than 10 percent of the total restoration area, a control plan will be developed specific to the species. As part of this plan, we will evaluate whether it is feasible to control the growth of invasive species given that certain invasive plants are found prevalent in the surrounding properties of the Metal Bank site.

Control measures typically fall into one of three categories: mechanical, chemical, or biological. Mechanical methods (digging and pulling) are only effective for smaller areas of species without an extensive root structure. Biological methods have only been developed for a small number of invasive plants (primarily purple loosestrife, an invasive wetland plant species), and there are greater uncertainties associated with their use. In most instances, chemical control measures are typically needed to control invasive species. Although specific treatments will be refined based on the results of the monitoring program, it is anticipated that the most effective general approach for controlling invasive species in the majority of the area will be application of herbicides during the growing season (summer through fall) and then to cut (mulch) the invasives

during the winter. Repeat spot herbicide application may be required in the following growing season to achieve effective control.

Again, it should be noted that certain invasive plants are found prevalent in areas surrounding the site. As a result, we will continue to evaluate the efficacy of controlling the growth of invasive species for the Metal Bank site.

User: Sinn Spec: PIRNIE STANDARD File: P:\3809-009 Metal Bank\TEMP-SIMPLE DRAWINGS\RESEED_PLAN_NO_DIM_V2.DWG Scale: 1:1 Date: 09/28/2011 Time: 20:01 Lay



THIS FIGURE IS FOR INFORMATIONAL PURPOSES ONLY. IT DOES NOT DEPICT "AS-BUILT" CONDITIONS AND IS NOT TO SCALE.

ARCADIS
Infrastructure, environment, buildings

METAL BANK NPL SITE
COTTMAN AVENUE PRP GROUP
03809013

SITE LAYOUT
AREAS TO BE RE-SEEDED
NOT TO SCALE

JULY 2011
FIGURE 1

From:	Joseph Vitale
To:	fang.sharon@epa.gov
Cc:	"George.Horvat@exeloncorp.com"; john.dobi@pseg.com; Mike Bock; mpollich@pa.gov; Pluta.Bruce@epamail.epa.gov
Bcc:	Dan Jordanger (djordanger@hunton.com)
Subject:	Metal Bank
Date:	Wednesday, November 30, 2011 5:25:00 PM
Attachments:	BioaccumProposal 11302011.pdf Memo re cylinder observations.pdf

Sharon:

As a result of our meeting with EPA on November 2nd , we developed the following action items:

1. Prepare a technical memorandum with more detailed discussion on our proposal to conduct biological monitoring using Corbicula rather than Lumbriculus

2. Provide a copy of Normandeau's inspection logs associated with the Lumbriculus Study conducted in July 2011

3. Provide a response to EPA's request to conduct a second fish study. EPA's request for this study is contained in a letter dated October 19, 2011

4. In the early 2000's timeframe, apparently EPA and Group representatives conducted an inspection of the mudlflat and the Delaware River near the Metal Bank site. Kathy Patnode and John Dobi were in attendance at that inspection. According to Ms. Patnode, one of the objectives of this inspection was to make observations regarding the presence of various benthic organisms. Based on that inspection, Ms. Patnode recalls that the cubicula population was very low. During our meeting, EPA requested that we gather additional information from Dr. Dobi regarding this inspection.

   - Regarding item #1, Mike Bock of Environ prepared a technical memorandum providing more detail on our request to substitute Corbicula for Lumbriculus in our biological monitoring program. A copy of this memorandum is attached to this email.

   - Regarding item #2, we have attached a memorandum prepared by Bryan Lees of Normandeau Associates along with their inspection and photo logs.

   - Regarding item #3 as stated in my email to you on November 22, 2011, the Group's response to EPA's request to conduct a second fish study, which was due by the end of this month (November), was predicated on resolving or at least understanding how Mike Mahoney of EPA Fort Meade recalculated EPA's fish sample splits as presented in EPA's letter dated October 19, 2011. After David Thal of Environmental Standards (Group's Data Validator) made several attempts to discuss this issue with Mr. Mahoney, Mr. Mahoney finally called Mr. Thal back today; however, because of time constraints they were

not able to complete their discussion. I am hopeful that David Thal and Mike Mahoney can complete their discussion by the end of this week or early next week. Within two weeks of Mr. Mahoney and Mr. Thal completing their discussion on how EPA re-calculated the PCB data, the Group will response to EPA's request to conduct a second fish study.

- Regarding item #4, I discussed with John Dobi the inspection that had occurred in the early 2000's. According to John, the purpose of the inspection was to locate suitable sediment substrate for future biological testing rather than observing the presence of various benthic organisms. Given that neither you nor I were present at this inspection, gathering additional information may require more discussion with John's and Kathy's participation.

Sharon, I will give you a call tomorrow to develop a plan moving forward to resolve these issues related to the biological monitoring program for the Metal Bank site.

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ENVIRON

Date: November 30, 2011

Draft MEMORANDUM

To: Joe Vitale, PE

From: Mike Bock, Ph.D.

Subject: In-situ Bioaccumulation Testing
Long-term Monitoring Program for the Metal Bank NPL Site

As discussed during the 2 November 2011 meeting with EPA, I have expanded on our proposal to replace the current *Lumbriculus* bioaccumulation monitoring program required by the Long Term Monitoring Plan (LTM) (Arcadis 2011) with a *Corbicula* bioaccumulation monitoring program. As required by the LTM, sediments at the Metal Bank site are the subject of ongoing monitoring to characterize the effectiveness of the remedy. The LTM specifies the monitoring of the bioaccumulation of PCBs by benthic invertebrates inhabiting the mudflats proximate to the facility. As described previously, to date a single round of bioaccumulation monitoring has been completed, but due to unforeseen issues with the survivorship of the test organisms, the data are insufficient to meet all of the Data Quality Objectives (DQOs). ENVIRON proposes to modify the bioaccumulation monitoring program to substitute in-situ *Lumbriculus variegatus* testing with in-situ *Corbicula fluminia* testing.

Requirements of a Successful Bioaccumulation Monitoring Program

Based on a survey of the literature, two test species emerge as being most commonly employed in freshwater bioaccumulation studies, *Lumbriculus variegatus* and *Corbicula fluminia*. The choice of organisms for bioaccumulation is critical to the success of the LTM program and should consider the stated preference for in situ testing of caged organisms. Ingersoll et al (1996) generally recommends the use of *Lumbriculus variegatus* for laboratory bioaccumulation testing and its suitability for bioaccumulation measurements. This recommendation is based largely on the ease with which this species can be cultured in the laboratory. Ingersoll et al (1996) recognizes that other species such as bivalves are suitable for use while presenting some difficulties with respect to obtaining and culturing test organisms. USEPA (1994, 2000) provides additional guidance regarding the choice of appropriate species. Perhaps the most important parameter is that the test organisms must be successfully maintained in a healthy condition over the course of the exposure duration. For caged studies, USEPA (2000) recommends the use of species that are well suited to the environmental conditions at the site and concludes that species which are naturally occurring, or surrogate species that closely resemble naturally occurring species, should be utilized.

An understanding of previous results at the site provide context for the proposed changes to the bioaccumulation monitoring plan. The benthic macro invertebrate community was analyzed during the summer of 2003 at sites on the mudflat immediately adjacent to the Metal Bank Facility, as well as at reference areas located across the Delaware River (Diamond 2004). Sites near the Metal Bank facility (MB-1, -2, -3, and -4) were generally dominated by contaminant tolerant oligochaetes. However, only relative abundances were reported and individuals per unit area were not report. Thus, the results of Diamond (2004) do not allow a direct assessment of the density or health of the benthic community. NOAA (1994) specifically presents *Corbicula* as

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a benthic species of importance inhabiting the mudflat. Neither study provides a detailed overview of the community structure associated with the site, nor do they assess if the distribution of benthic species is homogeneous or patchy, with different species occupying specific microenvironments. Anecdotal evidence suggests that *Lumbriculus* has limited tolerance for exposure and the excursions in temperature associated with this exposure. *Lumbriculus* extends its posterior into the water column to facilitate respiration, leading to the conclusion that this species is likely to be stressed by exposure to air during low tides at the site. Populations of *Lumbriculus* inhabiting the Metal Bank mudflat are likely to aggregate near the low tide line, near or within any tidal pools, or in areas of persistent water saturation, especially during spring tides and extreme weather. *Corbicula* is capable of closing its shell during low tide and is believed to be highly resistant to exposure during low tide.

The current bioaccumulation testing program is based on the in-situ exposure of *Lumbriculus variegatus* to onsite sediments using cages. The most recent round of bioaccumulation testing was completed in July of 2011. Of the six locations tested, no organisms were recovered from the two reference locations and less than 25 grams of the original 120 grams of mass were recovered for each of the four locations adjacent to the Metal Bank site (Bryan Lees Normandeau Associates, Inc. personal communication July 2011). The tissue recovered from the July 2011 testing period is sufficient to allow analysis using specialized methods, but it is insufficient to allow the creation of split samples. It is important to recognize that organism survival was not related to proximity to the Metal Bank site. Specifically, survivorship was not higher in the references area than in the onsite areas. The simplest explanation for the low survivorship is the challenging conditions at the site. The intertidal nature of the mudflat and the associated desiccation and extreme fluctuations in temperature introduce additional stress creating a significant risk of increased mortality and decreased growth.

Summary of Previous Results from the Study Area and Vicinity

We have located two examples of previous bioaccumulation testing at the study site, the first utilized *Corbicula fluminia* (NOAA 1994) and the second utilized *Lumbriculus variegatus* (Diamond 2004). The *Corbicula* study was based on the measurement of field collected organisms and co-located sediment samples. The *Lumbriculus* study was based on caged worms exposed over 28 days and co-located sediment samples. Although *Lumbriculus* is generally believed to have increased exposure as compared to bivalves due to the ingestion of bulk sediment, both species are exposed to chemicals in pore water (Ingersoll 1996, EPA 2000). In addition, bivalves are known to consume material from the sediment bed either through deposit feeding behavior (e.g., Levinton 1991; Miller et al 1992) or feeding on particles, phytoplankton, and bacteria originating from the sediment bed and transported across the sediment bed (e.g., Levinton 1991; Bock and Miller 1995; Miller et al 1996). Specifically, there are numerous reports of juvenile and less frequently adult, unionoid and spaeriid bivalves utilizing deposit feeding (Vaugh and HakenCamp 2001 and references therin). The literature also shows that *Corbicula* is capable of and routinely utilizing deposit feeding (Reid at al 1992; Hackenkamp and Palmer 1999; Vaugh and HakenCamp 2001).Thus; *Corbicula* is also subjected to dietary exposure to sediment born contaminants in a manner similar to *Lumbriculus*. Diamond (2004) provides limited information on experimental design and the datasheets and notebooks have been lost (Diamond personal communication) and thus the results should be weighted less heavily than a validated study. Nonetheless, these two studies do allow a comparison of bioaccumulation associated with two different benthic species.

Although NOAA (1994) and Diamond (2004) provide differing levels of documentation and utilized different organisms and experimental design, the results do provide a mechanism to compare *Corbicula* and *Lumbriculus* bioaccumulation at the Metal Bank mudflat. Diamond compares his BAF for dioxin-like PCB congeners (4.13 -7.9) to those reported in NOAA (1994)

(0.17-0.76), and he reports a difference as high as a factor of 50. Unfortunately, Diamond's comparisons are not valid. Specifically the BAFs reported by Diamond were reported in a dry weight tissue basis and the NOAA (1994) BAFs were reported on a wet weight tissue basis. Also, Diamond compared the highest congener specific values from his study to the lowest total PCB values from NOAA (1994) to arrive at the factor of 50 difference rather than comparing total PCBs and estimates of central tendency. We have recalculated the total PCB BAFs from both studies and have also calculated the lipid and organic carbon normalized BSAFs. As percent moisture values were not reported in NOAA (1994) we utilized a range of values consistent with those reported in the literature (85 to 90%). The *Lumbriculus* wet weight BAFs were calculated based on a typical literature value of 85% moisture. The recalculated BAFs and BASF are presented below:

Lumbriculus (Diamond 2004 Expert Report)								
SID	MB-1	MB-2	MB-3	MB-4	Min	Max	Mean	Median
BSAF	11.63	7.70	2.53	8.03	2.53	11.63	5.95	7.87
BAF (dry)	4.72	3.21	5.74	4.02	3.21	5.74	2.54	4.37
BAF (wet assuming 85% moisture)	0.71	0.48	0.86	0.60	0.48	0.86	0.66	0.66
Corbicula (NOAA 1994 Eco Risk Assessment)								
SID	MF-5	MF-7	MF-9	MF-10	Min	Max	Mean	Median
BSAF	0.52	0.97	4.13	1.43	0.52	4.13	2.55	1.20
BAF (dry assuming 85% moisture)	0.96	2.29	5.03	5.07	0.96	5.07	4.17	3.66
BAF (dry assuming 90% moisture)	1.44	3.43	7.54	7.61	1.44	7.61	2.75	5.49
BAF (wet)	0.14	0.34	0.75	0.76	0.14	0.76	0.50	0.55
BSAF = [mg tissue PCB / kg lipids]/[mg sed PCB/kg TOC]								
BAF = [mg tissue PCB/ kg body weight] / [mg sed PCb / kg sed]								
dry = the tissue mass does not include water								
wet = the tissue mass does include water								

The results show a high degree of concordance between the two studies as well as the mean value of 4.5 from the Philadelphia Academy of Science for the Delaware River reported in Diamond (2004). In fact, the BAFs for *Corbicula* assuming 90% moisture are higher than those reported for *Lumbriculus*. The BSAFs (lipid and TOC normalized BAFs) for *Lumbriculus* are higher than those reported for *Corbicula*, but sample specific lipid values are not provided in Diamond (2004) and the source of the single lipid value used is not provided. This data gap prevents accurately calculating sample specific BSAFs considering that a single lipid value was used for all samples in Diamond's calculations. In addition, the consistency of the lipid values cannot be used to assess the condition of the *Lumbriculus* samples. Low lipid values could be indicative of stress as the organisms may exhaust their stored lipids under stress resulting in a high bias in the BSAFs. Based on these confounding factors, the *Lumbriculus* BSAF values should be seen as an order of magnitude estimate and are consistent with the *Corbicula* values. Based on these analyses, the available onsite data demonstrate that BAFs obtained using *Corbicula* are expected to be comparable to those obtained using *Lumbriculus*.

Summary of the Comparable Results from Other Locals

PCB bioaccumulation studies have been performed at a number of other locals. We have compiled the readily available and relevant data from these studies to assess the comparability of BAFs obtained using various relevant invertebrate species. The results of this analysis are shown below:

Organisms	Location	BAF (range)	Basis	Source	Notes
Chironomid larvae	Artificial ponds Fields	4.2 2.9	unspecified, assumed to be dry	Larson 1984[a]	
Oligochaete	Niagara River	3	unspecified, assumed to be dry	Fox et al. 1983[a]	
Clam	Laboratory	2.4	unspecified, assumed to be dry	Tatem 1982[a]	
Prawn	Laboratory	1.1	unspecified, assumed to be dry	Tatem 1982[a]	
Clam	Field	6.1 (2.7-10.4)	lipid to TOC	MacDonald et al. 1993[a]	MacDonald et al. (1993) refers to these values as BSF rather than BAF.
Corbicula	Field	1.6 (0.52-4.13)	lipid to TOC	Metal Bank[a]	
Crayfish	Field	11 (2.0-23.7)	lipid to TOC	MacDonald et al. 1993[a]	
Invertebrates	Delaware River	5.8 (0.5-14.8)	lipid to TOC	Ashley et al. 2004	"Invertebrates" are composed of Amphipods, Grass Shrimp, Blue Crab, Crayfish, and White-fingered Mud Crab
Oligochaete	Unknown	0.8-0.9	lipid to TOC	Ingersoll et al. 1996	
Zooplankton	Field	5.0 (1.0-9.1)	lipid to TOC	MacDonald et al. 1993[a]	
Notes					
a-as presented in NOAA 1994					

The data in the table above demonstrates that the BAFs of PCBs for Oligochaetes (*Lumbriculus*) and *Corbicula* are in very fact similar. Fox et al. (1983) provides a BAF of 3, while Ingersoll et al. (1998) presents a BAF of 0.8-0.9. The *Corbicula* BAF of 1.6 (with a range of 0.52-4.13) falls well within the two values given for the Oligochaete BAF.

Conclusions

Corbicula fluminia is well suited for bioaccumulation testing (Roche et al 2009) and is a common inhabitant of the study area (Bilger, Riva-Murray, and Wall 1999; NOAA 1994). In addition *Corbicula fluminia* has been used for biological monitoring at a number of PCB contaminated sites (e.g., Lake Hartwell [GADNR,SCDNR,SCDOHEC,USACE and USFWS 2006]; Grasse River NY [McLeod et al, 2008]; Anacostia Watershed MD [Phelps 2003]; and the Columbia and Willamette Rivers WA [Sherman et al 2009]). The PCB bioaccumulation results for this species are demonstrated to be consistent and comparable to those obtained for *Lumbriculus variegates* and other Oligochaetes. Thus, we propose to revise the bioaccumulation testing program to be based on *Corbicula fluminia* rather than *Lumbriculus variegatus*. *Corbicula fluminia* is known to inhabit the study area and is an important prey species. Based on its occurrence on intertidal mudflats this species is likely to be highly resistant to exposure during low tide (Sherman et al 2009). *Corbicula fluminia* is a bivalve mollusk which is able to tightly seal is shell during low tide, preventing desiccation. Although the samples have not yet been processed, preliminary observation from the recently conducted benthic sampling reveal that both the study area and the reference areas did not contain a high density of sediment infauna and did not support a robust population of annelids (Bryan Lees, personal communication Nov 30, 2011). These observations indicate that the study area and reference areas represent marginal *Lumbriculus* habitat and supports the conclusion that an alternative species such as *Corbicula fluminia,* which has been observed in the vicinity of the site and were observed during the benthic survey, provides a more adaptable species for bioaccumulation monitoring.

The analyses presented above demonstrate the comparability of *Lumbriculus* and *Corbicula* for bioaccumulation testing at the study site and the advantages associated with using a bivalve species that is resistant to the stresses associated with tidal exposure. The only substantive difference between the proposed revised monitoring program and the current program is the

replacement of *Lumbriculus varieties* with *Corbicula fluminia* and the different requirements associated with deploying clam cages. *Corbicula* is expected to be well suited to the environmental conditions at the site due to it resistance to exposure and it propensity for deposit feeding and therefore provide a more reliable method for assessing the bioaccumulation of PCB to sediment dwelling invertebrates.

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MEMORANDUM

TO: Joe Vitale

BY: Bryan Lees

DATE: 28 November 2011

SUBJECT: Metal Bank Worm Bioaccumulation Study Test Chamber Monitoring

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An In-situ Worm Bioaccumulation Study was completed by Normandeau Associates, Inc (Normandeau) during the summer of 2011 at the Metal Bank Superfund Site. The Standard Operating Procedure (SOP-05, August 2010 Rev. 1) for the study required that monitoring of the test chambers be completed throughout the 28 day study period. The study period began on June 29, 2011 and ended on July 28, 2011. During the study period Normandeau completed a total of 10 field visits to the study locations. The first field visit occurred on July 1, 2011 and the final visit occurred on July 25, 2011 (Table 1). A log of each field visit was recorded and provided in Table 1.

During each monitoring visit a Normandeau scientist visually observed the test chambers at each of the six stations. Each field visit coincided with a low tide so that each test chamber could be visually observed. The field visits were intended to determine if the test chambers were intact and at the correct depth and position. Besides visually observing the test chambers, the Normandeau scientist also physically touched the end caps of the test chamber to make sure they were properly secured. If necessary, debris were removed from the test chamber apparatus. If the depth or position of the study chambers was observed to have changed, the Normandeau scientist adjusted the position accordingly. The depth of the test chambers was maintained at or within 4 inches below the sediment surface per QAPP Worksheet 18-1 dated August 2010. Photographs 1 through 4 show the test chamber apparatus after installation and during the study period.

Table 1. Test chamber observation log for the Metal Bank Worm Bioaccumulation Study .

Date	Time	Observer	Comments
7/1/2011	915	BWL	Observed cylinders at stations 1-4 at Metal Bank site. All cylinders intact and at proper depth. Observed cylinders at stations 5-6. Lumbriculus variegatus observed in 1/2 inch tubes for several cylinders. All worms appeared healthy and lively.
7/5/2011	1500	RAB	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/8/2011	1300	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/11/2011	550	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/13/2011	650	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/15/2011	830	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/18/2011	1115	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/20/2011	1200	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/22/2011	1330	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.
7/25/2011	600	BWL	Observed cylinders at stations 1-6. All cylinders intact and at proper depth.

Notes:

1. Bioaccumulation study was initiated on 6/29/11 for Stations 1-4 and on 6/30/11 for Stations 5 and 6.
2. Bioaccumulation study was completed on 7/27/11 for Stations 1-4 and on 7/28/11 for Stations 5 and 6.

Photograph 1. Test chamber apparatus for Station 1 after installation was completed.

Photograph 2. Test chamber apparatus for Station 2 during the study on July 18, 2011.

Photograph 3. Test chamber apparatus for Station 5 during the study on July 18, 2011.

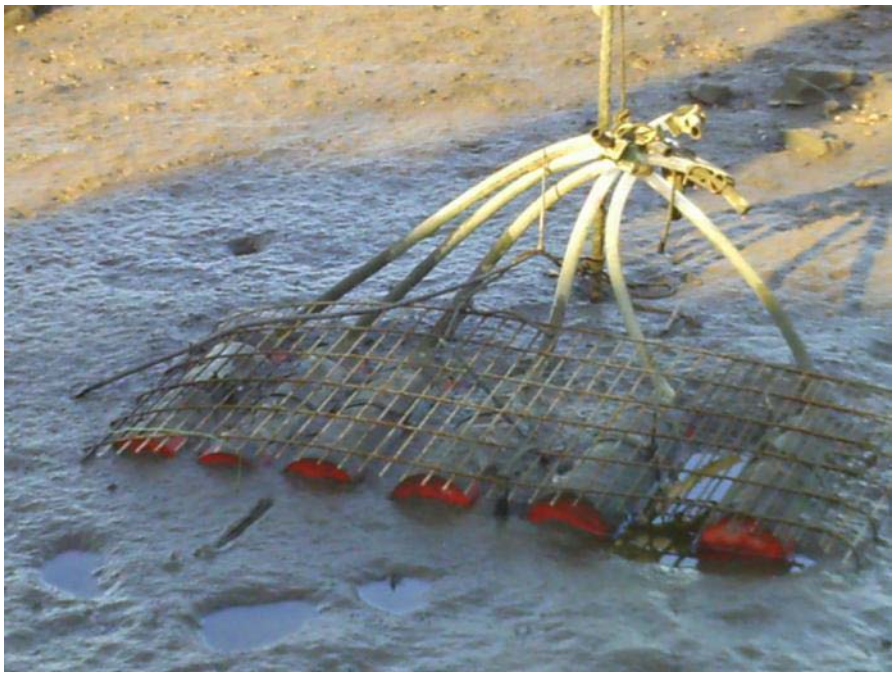

Photo 4. Test Chamber Apparatus Station 1 prior to retrieval on July 27, 2011